

St. George Basin Play 2: South Platform Play

Geological Assessment

GRASP UAI: AAAAAJAC

Play Area: 7,950 square miles

Play Water Depth Range: 320-535 feet

Play Depth Range: 4,125-6,875 feet

Play Exploration Chance: 0.125

Play 2, South Platform, St. George Basin OCS Planning Area, 2006 Assessment, Undiscovered Technically-Recoverable Oil & Gas			
Assessment Results as of November 2005			
Resource Commodity (Units)	Resources *		
	F95	Mean	F05
BOE (Mmboe)	0	194	870
Total Gas (Tcfg)	0.000	0.885	4.086
Total Liquids (Mmbo)	0	36	143
Free Gas** (Tcfg)	0.000	0.880	4.074
Solution Gas (Tcfg)	0.000	0.005	0.013
Oil (Mmbo)	0	14	39
Condensate (Mmbc)	0	22	104

* Risked, Technically-Recoverable
 ** Free Gas Includes Gas Cap and Non-Associated Gas
 F95 = 95% chance that resources will equal or exceed the given quantity
 F05 = 5% chance that resources will equal or exceed the given quantity
 BOE = total hydrocarbon energy, expressed in barrels-of-oil-equivalent, where 1 barrel of oil = 5,620 cubic feet of natural gas
 Mmb = millions of barrels
 Tcf = trillions of cubic feet

Table 1

Play 2, the “South Platform” play, is the second most important play (of four plays) in the St. George Basin OCS Planning Area, with 27% (194 Mmboe) of the Planning Area energy endowment (712 Mmboe). The overall assessment results for play 2 are shown in [table 1](#). Oil and gas-condensate liquids form 19% of the hydrocarbon energy

endowment of play 2. [Table 5](#) reports the detailed assessment results by commodity for play 2.

[Table 3](#) summarizes the volumetric input data developed for the *GRASP* computer model of St. George basin play 2. [Table 4](#) reports the risk model used for play 2. The location of play 2 is shown in [figure 1](#).

The south platform includes the area south of the St. George graben to the continental slope and east of Pribilof Canyon. This stable platform area generally contains less than 10,000 feet of nearly flat-lying strata, separated from acoustic basement by an angular unconformity. The overlying strata range in age from middle Eocene to Pleistocene and were mostly deposited in a marine-shelf environment. The basement at the COST No. 1 well consists of basaltic igneous rocks, but Mesozoic and lower Tertiary sedimentary rocks occur below the acoustic basement unconformity elsewhere.

Potential traps in play 2 include anticlinal structures within the acoustic basement, drape of Tertiary sands over basement highs, fault-bounded traps, and stratigraphic onlap onto basement highs. Five exploratory wells and one COST well were drilled in the south platform play area, all of which were plugged and abandoned with only minor gas shows encountered.

The best reservoir-rock potential is in the Oligocene section. The COST No. 1 well contained individual sandstone beds greater than 150 feet thick, with an aggregate total of 1,200 feet. Porosities were as high as 25 percent and permeabilities were as high as 37 millidarcies (Turner and others, 1984a).

Permeabilities were as high as 300 to 400 millidarcies in Oligocene sandstones in the Shell Y-0454 well.

Source-rock potential in the south platform area appears to be poor. The sediments were deposited under oxidizing conditions and are low in TOC. Only gas-prone kerogen types were present in samples from the COST No. 1 well, and the rocks were thermally immature. The oil window occurs at approximately 12,000 feet, so any hypothesized thermally mature hydrocarbon source must involve rocks that lie below the acoustic basement unconformity, the latter generally shallower than 10,000 feet in this play area.

These 18 pools range in mean conditional (un-risked) recoverable volumes from 2.7 Mmboe (pool rank 18) to 268 Mmboe (pool rank 1). Pool rank 1 ranges in possible conditional recoverable volumes from 19 Mmboe (F95) to 869 Mmboe (F05), or in a gas case from 0.107 Tcfge (F95) to 4.884 Tcfge (F05). [Table 2](#) shows the conditional sizes of the 10 largest pools in play 2.

In the computer simulation for play 2 a total of 22,836 “simulation pools” were sampled for size. These simulation pools can be grouped according to the USGS size class system in which sizes double with each successive class. Pool size class 10 contains the largest share (4,250, or 18.6%) of simulation pools (conditional, technically recoverable BOE resources) for play 2. Pool size class 10 ranges from 16 to 32 Mmboe. The largest simulation pool for play 2 falls within pool size class 18, which ranges in size from 4,096 to 8,192 Mmboe (or 23 to 46 Tcfge). [Table 6](#) reports statistics for the simulation pools developed in the *GRASP* computer model for play 2.

Play 2, South Platform, St. George Basin OCS Planning Area, 2006 Assessment, Conditional BOE Sizes of Ten Largest Pools			
Assessment Results as of November 2005			
Pool Rank	BOE Resources *		
	F95	Mean	F05
1	19	268	869
2	7	84	269
3	4	43	129
4	2.4	26	78
5	1.8	18	54
6	1.45	14	40
7	1.22	11	31
8	1.07	9	25
9	0.96	8	21
10	0.83	7	18

* Conditional, Technically-Recoverable, Millions of Barrels Energy-Equivalent (Mmboe), from "PSRK.out" file
 F95 = 95% chance that resources will equal or exceed the given quantity
 F05 = 5% chance that resources will equal or exceed the given quantity
 BOE = total hydrocarbon energy, expressed in barrels-of-oil-equivalent, where 1 barrel of oil = 5,620 cubic feet of natural gas

Table 2

A maximum of 18 hypothetical pools is forecast by the aggregation of the risk model and the prospect numbers model for play 2.

GRASP Play Data Form (Minerals Management Service - Alaska Regional Office)

Basin: St. George Basin
Play Number: 2
Play UAI Number: AAAAAJAC

Assessor: Comer
Play Name: South Platform Play

Date: March, 2005

Play Area (mi²: millions of acres): 7,950 (5.088)
Reservoir Thermal Maturity, % Ro:

Play Depth Range, feet: 4125 - 5500 - 6875
Expected Oil Gravity, ° API: 35
Play Water Depth Range, feet: 320 - 425 - 535
Prospect Distance from shore, miles: 340

POOLS Module (Volumes of Pools, Acre-Feet)

Fractile	F100	F95	F90	F75	F50	Mean / Std. Dev.	F25	F15	F10	F05	F02	F01	F00
Prospect Area (acres)-Model Input					24450	---				105000			-
Prospect Area (acres)-Model Output	906	5693	7855	13451	24450	36202 / 39532	44444	61246	76102	105000	150843	192051	204000
Fill Fraction (Fraction of Area Filled)	0.02	0.06	0.07	0.09	0.12	0.13256 / 0.62222	0.16	0.19	0.21	0.25	0.3	0.34	0.63
Productive Area of Pool (acres)	9	343	562	1286	3227	8018.55 / 14960.02	8096	13262	18526	30404	53099	77007	152000
Pay Thickness (feet)	44	95	104	122	145	149.949 / 39.863	172	189	202	221	246	264	477

MPRO Module (Numbers of Pools)

Play Level Chance	0.5	Prospect Level Chance	0.25	Exploration Chance	0.125
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Risk Model	Play Chance	Petroleum System Factors	Prospect Chance
	[See Risking Sheet]		

Fractile	F100	F95	F90	F75	F50	Mean / Std. Dev.	F25	F15	F10	F05	F02	F01	F00
Numbers of Prospects in Play	6	11	12	14	17	18.28 / 4.69	21	23	24	27	28	29	30
Numbers of Pools in Play	~	~	~	F49.46=0	F45 = 2	2.28 / 2.76	4	6	6	7	9	10	18

Minimum Number of Pools	0	Mean Number of Pools	2.28	Maximum Number of Pools	18
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POOLS/PSRK/PSUM Module (Play Resources)

Fractile	F100	F95	F90	F75	F50	Mean / Std. Dev.	F25	F15	F10	F05	F02	F01	F00
Oil Recovery Factor (bbl/acre-foot)	38	90	99	118	143	148.959 / 43.806	173	192	206	228	256	277	532
Gas Recovery Factor (Mcf/acre-foot)	38	145	170	224	303	336.071 / 162.708	410	483	539	635	763	863	2444
Gas Oil Ratio (Sol'n Gas)(cf/bbl)	64	189	216	269	344	367.931 / 140.682	439	501	548	625	725	800	1856
Condensate Yield ((bbl/Mmcf))	10	19	20	22	25	25.337 / 4.240	28	30	31	33	35	37	50

Pool Size Distribution Statistics from POOLS (1,000 BOE): μ (mu) = 10.3062926 σ^2 (sigma squared) = 2.16634879 Random Number Generator Seed = 733240

BOE Conversion Factor (cf/bbl)	5620	Probability Any Pool Contains Both Oil and Free Gas (Gas Cap)	0.05
Probability Any Pool is 100% Oil	0	Fraction of Pool Volume Gas-Bearing in Oil Pools with Gas Cap	0.3
Probability Any Pool is 100% Gas	0.95		

Table 3. Input data for St. George basin play 2, 2006 assessment.

GRASP - Geologic and Economic Resource Assessment Model - PSUM Module Results

Minerals Management Service - Alaska OCS Region
 GRASP Model Version: 8.29.2005)
 Computes the Geologic Resource Potential of the Play

Play UAI: AAAAAJAC **Play No. 2**

World Level - World Level Resources
 Country Level - UNITED STATES OF AMERICA
 Region Level - MMS ALASKA REGION
 Basin Level - **ST. GEORGE** **BASIN**
Play Level - 2 South Platform Play

Geologist Comer
 Remarks South Platform
 Run Date & Time: Date 19-Sep-05 Time 14:10:58

Summary of Play Potential

Product	MEAN	Standard Deviation
BOE (Mboe)	193,880	362,270
Oil (Mbo)	14,104	87,503
Condensate (Mbc)	22,345	42,978
Free (Gas Cap & Nonassociated) Gas (Mmcfg)	879,610	1,657,200
Solution Gas (Mmcfg)	5,150	33,694

10000 (Number of Trials in Sample)
 0.4943 (MPhc [Probability] of First Occurrence of Non-Zero Resource)
 Windowing Feature: used

Empirical Probability Distributions of the Products

Greater Than Percentage	BOE (Mboe)	Oil (Mbo)	Condensate (Mbc)	Free (Gas Cap & Nonassociated) Gas (Mmcfg)	Solution Gas (Mmcfg)
100	0	0	0	0	0
99.99	0	0	0	0	0
99	0	0	0	0	0
95	0	0	0	0	0
90	0	0	0	0	0
85	0	0	0	0	0
80	0	0	0	0	0
75	0	0	0	0	0
70	0	0	0	0	0
65	0	0	0	0	0
60	0	0	0	0	0
55	0	0	0	0	0
50	0	0	0	0	0
45	47,113	2,873	5,398	217,360	931
40	93,322	4,294	11,066	436,600	1,556
35	140,130	3,389	16,956	672,030	1,180
30	189,340	6,060	23,175	897,670	2,108
25	254,440	11,795	30,185	1,190,100	3,968
20	332,450	17,670	38,363	1,546,800	6,633
15	434,060	26,643	50,255	1,998,400	8,807
10	584,350	39,978	67,518	2,663,100	16,822
8	667,930	44,264	77,503	3,054,200	15,291
6	787,240	49,861	92,726	3,604,900	18,018
5	870,430	39,192	104,170	4,073,600	12,534
4	993,030	82,760	115,960	4,434,000	30,024
2	1,351,100	97,045	154,360	6,149,400	31,135
1	1,746,400	221,060	189,270	7,424,900	83,949
0.1	3,011,800	0	306,450	15,204,000	0
0.01	5,600,100	0	700,510	27,536,000	0
0.001	6,338,200	0	957,100	30,242,000	0

Table 5. Assessment results by commodity for St. George basin play 2, 2006 assessment.

Basin: ST. GEORGE BASIN Play 02 - South Platform Play UAI Key: AAAAAJAC				Model Simulation "Pools" Reported by "Fieldsize.out" GRASP Module																		
Classification and Size				Pool Count Statistics			Pool Types Count		Mixed Pool Range		Oil Pool Range		Gas Pool Range		Total Pool Range		Pool Resource Statistics (MMBOE)					
Class	Min (MMBOE)	Max (MMBOE)	Pool Count	Percentage	Trial Average	Trials w/Pool Avg	Mixed Pool	Oil Pool	Gas Pool	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Total Resource	Average Resource	
1	0.0312	0.0625	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.000000	0.000000	
2	0.0625	0.125	3	0.013137	0.0003	0.000607	0	0	3	0	0	0	0	0	1	1	1	1	1	0.089992	0.122856	
3	0.125	0.25	14	0.061307	0.0014	0.002832	0	0	14	0	0	0	0	0	1	1	1	1	1	0.140666	0.245670	
4	0.25	0.5	56	0.245227	0.0056	0.011327	1	0	55	1	1	0	0	0	1	1	1	1	1	0.253014	0.498938	
5	0.5	1	187	0.818882	0.0187	0.037824	6	0	181	1	1	0	0	0	1	2	1	2	1	0.506842	0.999784	
6	1	2	482	2.110703	0.0482	0.097492	6	0	476	1	1	0	0	0	1	3	1	3	1	1.004883	1.997523	
7	2	4	1162	5.088457	0.1162	0.235032	24	0	1138	1	1	0	0	0	1	3	1	3	1	2.000762	3.998848	
8	4	8	2311	10.119986	0.2311	0.467435	62	0	2249	1	1	0	0	0	1	6	1	6	1	4.005127	7.996260	
9	8	16	3450	15.107724	0.345	0.697816	113	0	3337	1	2	0	0	0	1	5	1	5	1	8.003240	15.998968	
10	16	32	4250	18.610966	0.425	0.859628	175	0	4075	1	2	0	0	0	1	5	1	5	1	16.008567	31.992173	
11	32	64	3934	17.227184	0.3934	0.795712	202	0	3732	1	3	0	0	0	1	5	1	6	1	32.013110	63.985227	
12	64	128	3235	14.166228	0.3235	0.654328	188	0	3047	1	2	0	0	0	1	5	1	5	1	64.010550	127.896676	
13	128	256	2089	9.147837	0.2089	0.422532	172	0	1917	1	2	0	0	0	1	6	1	6	1	128.255074	255.957856	
14	256	512	1055	4.619898	0.1055	0.21339	103	0	952	1	2	0	0	0	1	3	1	3	1	256.213345	511.197011	
15	512	1024	444	1.944299	0.0444	0.089806	56	0	388	1	1	0	0	0	1	2	1	2	1	513.116506	1021.452000	
16	1024	2048	146	0.639341	0.0146	0.029531	19	0	127	1	1	0	0	0	1	2	1	2	1	1024.621000	2047.664000	
17	2048	4096	16	0.070065	0.0016	0.003236	5	0	11	1	1	0	0	0	1	1	1	1	1	2095.894000	3464.331000	
18	4096	8192	2	0.008758	0.0002	0.000405	0	0	2	0	0	0	0	0	1	1	1	1	1	4817.392000	6402.772000	
19	8192	16384	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.000000	0.000000	
20	16384	32768	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.000000	0.000000	
21	32768	65536	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.000000	0.000000	
22	65536	131072	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.000000	0.000000	
23	131072	262144	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.000000	0.000000	
24	262144	524288	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.000000	0.000000	
25	524288	1048576	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.000000	0.000000	
Not Classified			0	0	0	0	Below Class	0	0	0		Below Class	0	0	0	0	0	0	0	0	0.000000	0.000000
	Totals		22836	100	2.2836	4.618932	Above Class	0	0	0		Above Class	0	0	0	0	0	0	0	0	0.000000	0.000000

Number of Pools not Classified: 0	Min and Max refer to numbers of pools of the relevant size class that occur within any single trial in the simulation.	Min and Max refer to aggregate resources of the relevant size class that occur within any single trial in the simulation.
Number of Pools below Class 1: 0		
Number of Trials with Pools: 4944		

Table 6. Statistics for simulation pools created in computer sampling run for St. George basin play 2, 2006 assessment.

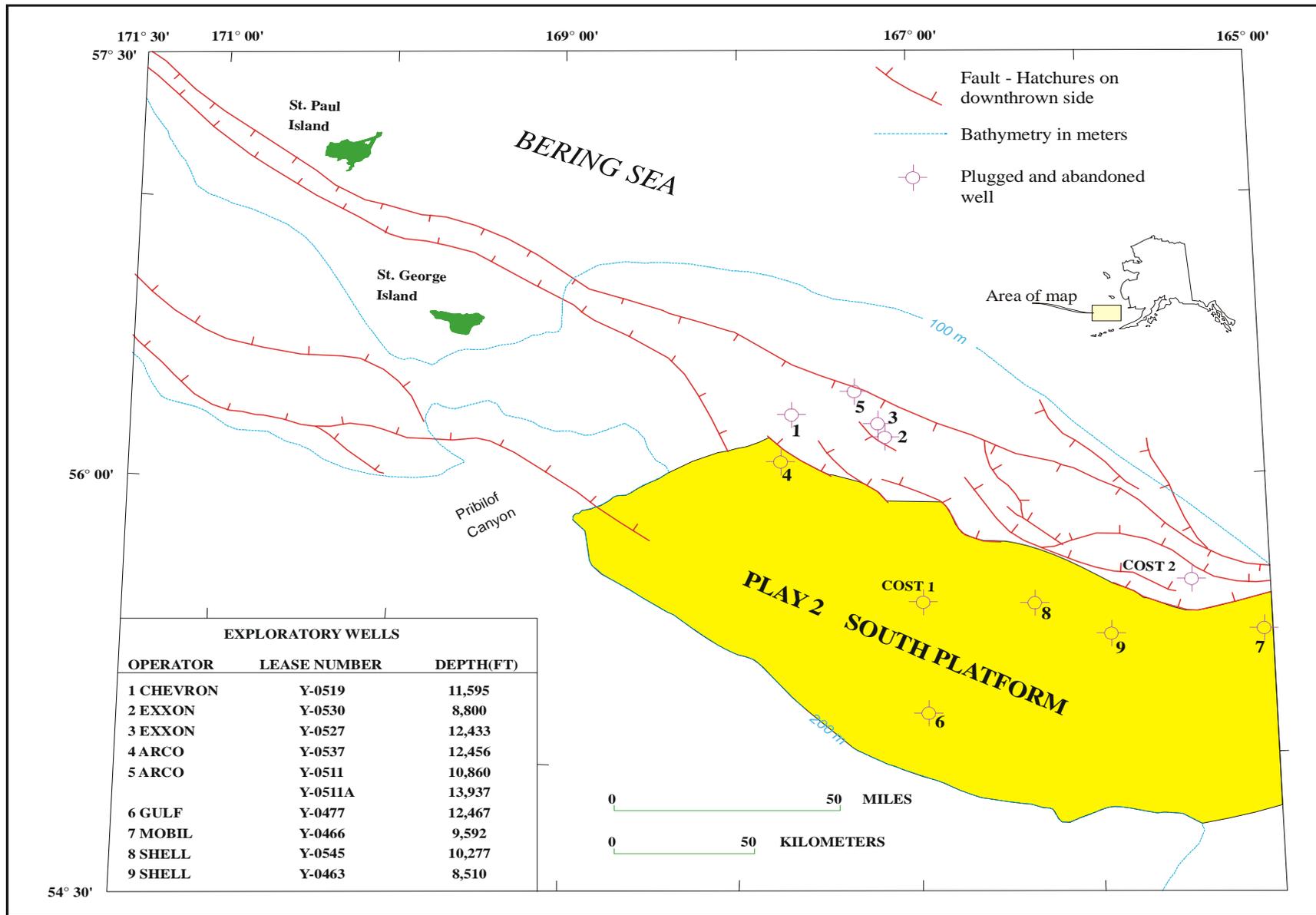


Figure 1. Map location of St. George basin play 2, 2006 assessment.